.GREEN INFRASTRUCTURE FOR COASTAL RESILIENCE
PILOT GRANTS PROGRAM FY14
RFR ENV 14 CZM 07

Applicant: Brewster, Massachusetts (Cape Cod & the Islands)
Address: Brewster Town Offices
2198 Main Street
Brewster, MA 02631

Local Project Manager:
Name: Chris Miller
Department: Natural Resources
Email: cmiller@brewster-ma.gov
Phone: 508-896-4546 or cell 508-525-9135
Fax: 508-896-8089

Type of Green Infrastructure Project:

1) Beach, berm and dune building, enhancement, or restoration with compatible sediment and native vegetation
2) Bio-engineering with coir rolls, natural fiber blankets, and other organic, biodegradable materials combined with planting/re-vegetation
3) Natural enhancement/covering of an existing coastal structure

Project Title: *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach*

Total Project Cost: $268,825

Match Amount (at least 25% of TOTAL project cost): $69,222 (cash and in-kind)

Grant Amount Requested (maximum of $500,000): $200,000

Project Summary (*brief description of the proposed project in one or two short paragraphs)*

Breakwater Landing is a Town-owned 3.4-acre park, including a 59-space parking area and an approximately 300-foot beach located on Cape Cod Bay. This is also an important access point to the Brewster Flats for vehicles providing emergency response, and for the public who utilize it for over sand transport of machinery and sand for nourishment projects on private properties within about a 1 mile radius. This Landing has been subject to repetitive severe storm damage. The Town has regularly reconstructed a sacrificial vegetated dune at the north end of the lot after major storm events, plus a sturdy sand fence to capture additional wind-blown sand. Despite this work, the Town has lost 4-6 parking spaces and currently sand deposition has occurred 100 ft. into the parking lot.

The Town plans to remove and relocate the asphalt parking lot from near the beach to an area less vulnerable to storm damage, provide comparable parking, restore an extensive protective and resilient dune habitat behind the beach, improve beach access, and minimize impervious cover. This involves a coastal retreat of over 140 feet for our parking infrastructure, and uses natural systems (vegetated dunes and elevation increase) to provide resilience and habitat.

This application is for:

- design and permitting
- construction, installation and monitoring
- and will be completed within 14 months.

1. PROBLEM: *Severity of the erosion or flooding issue(s) or problem(s), current and potential threats and impacts to coastal infrastructure and natural resources, and need for assistance. (15 points)*

The Town of Brewster is a rural coastal town on Cape Cod, located on Cape Cod Bay. Brewster is approximately 25 square miles in area, with a shoreline of over 6 miles. At low tide, the sea recedes up to two miles offshore, exposing approximately 12,000 acres of tidal flats in Brewster alone. Our year round population is approximately 9,820, plus a 25,000 person seasonal population. Our local economy is largely tourism based, and "the beach" is the number one reason tourists visit, as reported by the Brewster Chamber of Commerce. Brewster is very rural, with nearly one-third of its land area as protected open space.

Brewster's 10 Landings provide access to public beach and the extensive tidal flats. Many of these Landings do not have large parking areas and are mostly just the road layout where it reaches the beach; while two of them are almost a ½ mile walk from parking areas.

Brewster is facing many management decisions for its landings and beaches as most are located between a beach/dune area and wetlands. The coastal area is critically important to Brewster's coastal character and economy. In past years the Town has lost available parking spaces at four of its larger beach parking areas; we have addressed one through coastal retreat/habitat restoration and rebuilding of the parking area at Paines Creek Landing; however, this provided less public parking than the historic parking lot out in the dunes. Breakwater Landing is the only other landing where we have the available land to allow retreat and restoration of natural systems to provide protection for our infrastructure, as detailed in this proposal.

The Town's entire coastline is currently in the FEMA VE flood zone and most or all of its tidal marsh and creek system are mapped as AE. In the past five years, extensive parts of coastal Brewster have been exposed to storm surge impacts, including dune washover, flooding and significant erosion. In some areas, up to 20 feet of dune/coastal bank have been lost in a single storm event, including at the Breakwater Landing property.

Breakwater Landing is a Town-owned 3.4-acre park, including a 59-space parking area and an approximately 300-foot beach located on Cape Cod Bay. This is also an important access point to the Brewster Flats for vehicles providing emergency response, and for the public who utilize it for over sand transport of machinery and sand for nourishment projects on private properties within about a 1 mile radius. This Landing has been subject to repetitive severe storm damage, and has lost 4 parking spaces since 2009 (Att. 4 Site Photos).

CZM coastal transect CCB-0959 bisects the parking area at Breakwater Landing, and shows an erosion rate of 0.56 feet/year (Att. 1.b Massachusetts Shoreline Change Transect).

The Town has regularly reconstructed a sacrificial vegetated dune at the north end of the lot after major storm events and has installed a sturdy sand fence to capture additional wind-blown sand. Despite this work, the Town has lost 4 parking spaces and currently sand deposition during storms has occurred 100 ft. into the parking lot. At this time, the Town and adjacent property owners to the west are just completing reconfiguring this vegetated dune (March 31-April 4, 2014). This work is being done as a Town match, but is not a part of this grant request *(Att. 2.a Proposed Maintenance to Existing Shoreline Protection plan & 4 o-p Site Photos).*

However, this single dune is not enough protection at this eroding beach. We propose a significant retreat project and establishment of an additional 140 feet of vegetated dunes as a resilient natural buffer for storm damage and sea level rise, as described herein. The parking area that is removed will be re-established over 375 feet from the beach. It will also be established at an over 8-foot higher elevation. The northern most dunes in the restoration area will be established at approximately 5 feet higher than the existing elevation. Even with a projected sea level rise of 3 feet, this resilient project will provide protection to our infrastructure for over 50 years.

The Town has been expending significant efforts and funds trying to repair the parking area and protective dune after storm events. At this point, the landing is suffering damage in even moderate storm events. Continued budget issues have prevented the Town from implementing resilient changes to this and other landings that will reduce

future expenditures for maintenance and repair. This grant opportunity presents a significant opportunity for the Town to properly address this ongoing and increasing expense while protecting and enhancing the environment.

2. PROJECT DESCRIPTION AND PUBLIC BENEFIT*: Details of the proposed green infrastructure project and stages of work to be funded; how the project will improve coastal resilience immediately at, adjacent to, and beyond the project site; and how the proposed project will benefit the public and public interests. (25 points)*

The objective is to remove the vulnerable portion of the paved Town parking lot at Breakwater Landing Beach, restore it to coastal beach and dune habitat, build a replacement parking lot using porous pavement at a more inland and elevated area, and install green stormwater infrastructure (e.g., vegetated bioretention or vegetated swale) to improve water quality for swimming, shellfishing and habitat. The Town is working with the Horsley Witten Group, a well-respected local engineering firm, which has prepared a 10% design plan and proposal for this work [See Engineered Plans and proposal from Horsley Witten Group (Att. 2.b Breakwater Conceptual Plan & 3 Budgets)].

Permitting: The proposed project will result in activities within coastal dunes, a regulated resource area under the MA *Wetlands Protection Act* (M.G.L. Ch. 131 § 40) and the Code of the Town of Brewster Wetlands Protection, Chapter172, *Brewster Wetlands Protection By-law*. The project will require permitting (an Order of Conditions) through the local Conservation Commission and the Massachusetts Department of Environmental Protection (DEP) under a Notice of Intent (NOI) application. We do not anticipate additional State-issued Permit or State agency review under the Massachusetts Environmental Policy Act (M.G.L. c. 30 §§ 61 through 62H, inclusive or MEPA) through an Environmental Notification Form (ENF). It does not appear that mandatory review through an Environmental Impact Report (EIR) would be required.

Description: The proposed green infrastructure concept consists of three main components:

1. Restoration of coastal habitat (Att. 2.b Breakwater Conceptual Plan)
   - Remove existing pavement (~10,300 sf) within 140 ft. of beach.
   - Restore a majority of this area back to a dune ecosystem, which will include bringing in sand from offsite, installation of dune fencing, and the planting of appropriate vegetation (e.g., American Beach grass, Beach Plum, Bayberry, and Sea-side Goldenrod). The northern half of this area will be elevated approximately 4 to 5 feet above existing grade, with the southern half about 2 feet above existing grade. This will add resilience to storm events and sea level rise.
   - An 8-foot wide path constructed of articulated concrete blocks (ACBs) will extend north from the remaining pavement to the entrance of the beach. This will normally be sand covered. This will allow continued vehicle access to the beach while not generating stormwater. These ACBs have proven to be very resilient to storm events. As erosion affects the beach, segments of the ACBs could be removed from the north end.
   - A seasonal boardwalk (Superdeck or equivalent) would be placed directly adjacent to the ACBs for foot traffic and to provide handicap access to the beach area. This would be removed for the fall/winter and replaced for the spring/summer season annually.

Public Benefit & Public Interests: Interpretive signage will be installed describing the retreat project; the benefits of using natural systems to provide resilience; using elevation to resist inundation; and the habitat values of coastal dunes.

The Town has been working with the adjacent neighbor to the west of the Landing. A vegetated dune and sturdy sand fence are being constructed March 31-April 4, 2014, just north of the existing pavement (Att. 2.a. Maintenance to Existing Shorefront Protection plan) as the transition from a full revetment on the up-drift properties to the west, to a dune habitat which begins on the neighboring property to the west and extends east across and beyond the Breakwater Landing property. See attached photos of recent storm damage and the newly completed work (Att. 4 o-p Site Photos).

The northern most 70 feet of former parking area will be filled with screened sand compatible with adjacent dune deposits. This area will be elevated approximately 4 to 5 feet above the elevation of the existing pavement, which

would be similar to the elevation of the dunes to the east and west of the parking area. This elevation will add to the resiliency of the dunes. South of there we will keep the back dune area at a slightly higher elevation than the existing parking lot. It is anticipated that the dunes will migrate south with prevailing winds.

The restoration area is approximately 140 feet by 83 feet. The sand to be placed is approximately 5 feet above existing grade for one half and 2 feet for the second half, or a total volume of 1090 cubic yards.

- Beach grass plugs will be planted in the restored area in late fall and through the winter up until mid-April. Dormant culms will be planted 8 inches deep, with two to three stems per hole, spaced 12 to 18 inches apart. Additional native plantings will be included. In the back dune area, approximately 150 1-gallon beach plum and 50 1-gallon bayberry plants will be included in the beach grass planting area.
- Town staff and volunteers will water the shrubs weekly, as needed through one growing season to ensure viability.

2. Retrofit of remainder of the existing parking lot (Att. 2.b Breakwater Conceptual Plan)

- Remove ~2,800 square feet of existing pavement along the western edge of the remaining parking lot (~15 foot x 150 foot strip) and replace with a grass swale that will be used to convey road and parking lot runoff into a bioretention facility. These Best Management Practices (BMPs) will be sized to manage at least 1 inch of runoff and will be planted with beach-appropriate grasses, shrubs, and ground cover. This vegetation will provide treatment by up-taking contaminants and nitrogen from runoff.
- A curb cut and paved flume will be used at the channel inlet, and a simple spillway would be provided for overflow from the bioretention cell (frequent overflow is unlikely given the sandy soils).
- The remaining parking area will be restriped to accommodate at least 29 parking spaces (9 foot by 18 foot.) including 3 handicapped spaces and at least two bike racks. The drive aisle width would be between 24 feet and 31 feet (shown at 31 feet); a narrower width would provide more flexibility in the swale design.
- A location for trash dumpster/restroom facilities could be provided closer to the main entrance.

Public Benefit & Public Interests: Interpretive signage will be posted near the bioretention area and trail access describing how natural systems can be used to infiltrate runoff and treat the excess nutrients generated by stormwater.

3. Addition of pervious overflow parking: (Att. 2.b Breakwater Conceptual Plan)

- Construct an overflow parking lot (~ 8,600 square feet) in the existing meadow located in the southeast portion of property. This parking area is proposed to be constructed with pervious asphalt and designed for 30 parking stalls (9 foot x 18 foot) with a 24-foot drive aisle width. At an average elevation of 20 feet and native sandy subsoils, only an 18-24 inch reservoir course would be required below the porous asphalt layer.
- Access to the overflow lot will be through a standard asphalt egress off of the existing entrance.
- The existing park and picnic area would be renovated.

Public Benefit & Public Interests: Interpretive signage will be posted near the entrance to the overflow parking lot describing the use of elevation to provide resilience to sea level rise, and also to highlight the use of permeable pavement to minimize stormwater generation.

3. CLIMATE ADAPTATION: *Consideration of future conditions including projected sea level rise scenario(s). (10 points)*

We reviewed the Massachusetts CZM Stormsmart Coast web site and materials prior to preparing this proposal, in particular the *StormSmart Coast Climate Adaptation:*

Strategy 4. Redesigning to Accommodate Changing Conditions and
Strategy 5. Enhancing Natural Storm-damage Protection.

The *Massachusetts Climate Change Adaptation Report* (MCCAR) identifies 12 strategies. Brewster's proposal specifically addresses several of these strategies in its approach.

MCCAR Strategies addressed:

1. Combine mitigation and adaptation strategies;
3. Advance risk and vulnerability assessments;
4. Evaluate and prioritize adaptation strategies for implementation;
6. Improve planning and land use practices;
7. Enhance emergency preparedness;
8. Encourage ecosystem based adaptation;
9. Continue to seek expert advice and stakeholder input;
10. Ensure agency and regional coordination;
12. Start now, be bold.

We considered the effects a 3-foot sea level rise by mid-century would have on the infrastructure at this location, and based the amount of retreat to allow over 50 years of protection for the parking area. As described earlier, the CZM rate of erosion at the property is 0.56 feet per year (Att. 1.b Massachusetts Shoreline Change Transects), and we anticipate this will likely increase with climate change.

4. TRANSFERABILITY: *Transferability of proposed project including details of education and outreach plan. (10 points)*

This project will work as a demonstration project on how retreat and elevation can be used to minimize the effects of storm damage and sea level rise on coastal infrastructure. It will also serve to demonstrate the effectiveness of natural dune systems in protecting public infrastructure. The Town will monitor the growth and health of the dune system, and also evaluate the effect of coastal storms over time, using photo documentation and survey as needed.

This project will also pilot the effectiveness of a resilient articulating block system to provide emergency vehicle access through a dune system.

The eastern most landing in Town is Crosby Landing, which is similar in that it has an extensive dune system between the parking area and the beach, with a path through the dunes for foot traffic. The end product of this restoration will be similar and should receive similar public acceptance.

A Brewster Coastal Committee, comprised of seven citizens appointed by the Board of Selectmen, will work closely with the Project Manager and Project Team. The Town will have public outreach throughout the permitting process, through Conservation Commission meetings, public updates from the Selectmen meetings, the Coastal Committee and the Town web site. These meetings are also televised and can be viewed via the Town web site.

Education & Outreach Plan: The Coastal Committee's outreach and public information activities will include:

- Two or more public informational meetings,
- Press releases,
- Town web-page describing the project and progress on specific tasks,
- Video coverage of meetings and of the project itself on our local cable channel and
- On-demand video off the Town web site;
- Public service announcements, and
- Outreach to specific landowner and community groups.

The Coastal Committee will also help design the special interpretive signs to build public understanding about the nature and value of the project.

Sustained Benefits: The extensive public outreach activities detailed herein will provide Brewster citizens with a better understanding of how the Town's coastal resources have evolved and their current and future vulnerabilities to erosion, sea level rise, storms and coastal change.

Other sustained benefits include:

- Less public infrastructure at risk
- Reduced need for continued public investment in hard infrastructure (retreat and resilience designs)
- Enhanced value of ecosystems services provided by coastal resources (dune restoration)
- Guide for public for management of privately owned coastal properties (example projects to emulate)
- Improved water quality and reduction in maintenance costs through implementation of green stormwater infrastructure (improved stormwater control, reduced maintenance)

5. TIMELINE: *Detailed timeline with anticipated completion dates for the project. (10 points)*

Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach:

ACTION	START	INTERIM ACTIONS	COMPLETION
Initial Task: Work with adjacent neighbor west of the landing. Construct vegetated dune/sturdy sand fence, just north of existing pavement as transition from full revetment on up-drift properties to west, to dune habitat which begins on neighboring property to west.	Late March 2014	Monitor growth of beach grass through spring/summer 2014.	April 4, 2014
Permitting and Design (HWG)	April, 2014	Introductory Public Meeting July 2014	Fall 2014
Project out to bid	Summer 2014	Coastal Committee meeting and press release prior to bidding.	Summer 2014
Pavement removal	October 14, 2014		End of October 2014
Grading and construction for overflow parking lot & entrance	October 15, 2014	Video coverage to update project website	End of October 2014
Placement of 29,375CF(1090CY) of sand	November 3, 2014	Video coverage to update project website	November 14, 2014
Installing 160 feet of ACBs	November 17, 2014	Video coverage to update project website	End of November 2014
Construction of stormwater BMPs	November 3, 2014	Video coverage to update project website	November 14, 2014
Planting of beach grass and shrubs	Winter 2014	Video coverage to update project website	Late Winter 2014
Dune fencing	Fall/winter 2014	Video coverage to update project website	Before April 2015
Bike racks, additional signs, enclosure for porta potty	Spring 2015	Video coverage to update project website	May 2015
Pavement Markings	Spring 2015	Video coverage to update project website	May 2015
Interpretive signage	April 2015	Draft signage presented in at least two public meetings summer 2014	May 2015
Installing seasonal handicap accessible walkway to beach	Spring 2015	Video coverage to update project website	May 2015
Watering plants, maintenance	Spring 2015	Public participation	Fall 2015

Town permit applications will be filed in early summer 2014, and will go out to bid in late summer 2014, with construction to be done in fall 2014.

6. BUDGET: Detailed budget and explanation of how the funding and other support provided by project partners will ensure success of the project. The 25% in-kind and cash match that has not been used for other projects must be documented. (10 points)

Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach:

Task	Budget	Cash Match	In-Kind
Initial Task: Work with adjacent neighbor west of the landing. Construct vegetated dune/sturdy sand fence, just north of the existing pavement as transition from full revetment on up-drift properties to west, to dune habitat which begins on neighboring property to west and extends east.	Although occurring at site, not included in grant	Town Match	Town Match
Permitting, design, bidding (HWG) (Att. 3.a.1. & 2.)	$ 45,000		
Pavement removal; construction of stormwater BMPs; grading and construction for overflow parking lot and entrance; erosion control; pavement markings; interpretive signage; dune fencing and bike racks (includes 30% contingency)	$116,000		
160 feet of ACBs (10- 8x16 foot mats) (includes 10% contingency)	$ 21,750		
Seasonal handicap accessible walkway to beach (SuperDeck or equivalent) 160 feet long, 5 foot wide @ $15.84/SF delivered (includes 10% contingency)		$12,675	
1090 cubic yards of sand, delivered and placed ($30/yard) (includes 10% contingency)	$ 5,000	$31,000	
Beach grass @$8,375, plus shrubs @$3,500, plus planting costs		$16,000	
Construction Administration (5% of construction cost)	$ 12,250		
Volunteer maintenance, watering of plants first growing season 100 hours @ $24/hour. Applying $400 to grant as remainder will be conducted after end of grant during summer 2015.			$400
Project Management (Chris Miller, Brewster DNR)			$8,750
Subtotals	$200,000.00	$59,675	$9,150
Project total	$268,825.00		
Match total (Cash and In-Kind)	$ 68,825.00		
CZM Grant request	$200,000.00		
Brewster Community Preservation Committee Request May 2014 Brewster Town Meeting (Att. 5. 1a Match Acknowledgement.)	$ 59,675.00		

7. PROJECT MANAGEMENT: Qualifications and experience of project manager and team. Resumes must be submitted. (10 points)

Project Management: Qualifications and experience of project manager and team.
The proposed Project Team will be led by Chris Miller, the Town of Brewster Natural Resources Department Director, with the Horsley Witten Group: Rich Claytor, P.E., Michelle West, P.E. and Amy Ball, CWS.

Town of Brewster:

Chris Miller, Brewster Natural Resources Department Director. The Town will provide over 250 hours for Chris Miller as match ($8,750).

Proposed role: Project Manager/Team Leader and staff support

Qualifications: Mr. Miller has a B.S. in Wildlife and Fisheries Biology from the University of Massachusetts (1990), and an M.S. in Chemical Engineering from Wayne State University (1995). Mr. Miller has a diverse background with 24 years of experience in environmental consulting, technical consulting, wildlife biology, and municipal service as a department head.

Mr. Miller is a member of the Stony Brook Salt Marsh Restoration Project Team that was awarded one of 50 NOAA-ARRA coastal restoration grants in 2009. In 2011 he was given a Coastal America Partnership award in for the Stony Brook restoration project and NOAA's Excellence in Restoration Award. In 2013 the Brewster Conservation Trust selected the Brewster Department of Natural Resources as its Conservationists of the Year. Chris, his department staff and their volunteer group of 150 people will be closely involved in the proposed project. Chris was the Project Manager for the Route 6a culvert replacement project, the Freemans Pond culvert replacement project, and the Stony Brook Mill Dam Rehabilitation project, all of which occurred simultaneously with multiple engineering firms and contractors, including federal reporting to NOAA and NRCS.

Horsley Witten Group (HW):

Rich Claytor, P.E., President

Proposed Role: Principal and Quality Control

Qualifications: Rich Claytor has more than 30 years of practical experience in civil and environmental engineering with specific expertise in water resources planning, design, implementation, research, education and training. Rich has extensive experience and expertise in stormwater management design, implementation, program assessment, policy and evaluation. Rich also is experienced in watershed planning, training and education; land use planning, site design and research; storm drainage, erosion/sediment control, roadway design; and construction administration. He has authored a variety of stormwater manuals and publications on stormwater policy, design and implementation, and presented at dozens of training workshops and conferences over the last two decades. He has served as the principal designer of stormwater management and stream restoration measures for a wide range of projects throughout New England and the Mid Atlantic. (Att. 3 a.3 Resumes)

Michelle L. West, P.E., Project Manager, Senior Ecologist

Proposed Role: Project Manager and Design Engineer

Michelle West, P.E., has twelve years of professional experience in civil and environmental engineering. Her specific expertise is in stormwater management, watershed planning, hydraulic/hydrologic modeling, and low impact development (LID) planning, assessment, design, and implementation. She has prepared materials for and presented at several technical training workshops on stormwater issues, LID, and erosion and sediment control (ESC). She also has experience with public education and outreach, particularly as part of municipal NPDES Phase II stormwater plan implementation, as well as with geographic information system (GIS) mapping, analysis, and modeling. (Att. 3 a.3 Resumes)

Amy Miller Ball, CWS, Project Manager, Senior Ecologist

Proposed Role: Permitting and Associated Dune Habitat Restoration

Qualifications: Amy Ball has more than 18 years of professional experience as a wetlands scientist and ecologist specializing in wetland botany and ecology, rare species and wildlife habitat assessments, wetland restoration and mitigation, environmental assessment and monitoring, and environmental policy evaluation. As a project manager and senior ecologist with the Horsley Witten Group, Ms. Ball manages projects requiring inland and coastal wetland resource area determinations, wildlife habitat assessments, impact mitigation, and regulatory compliance. Ms. Ball also manages project permitting for projects requiring federal, state, regional, and local permits pursuant to laws, regulations, and policies governing water resource and rare species protection. Ms. Ball frequently appears before local conservation commissions and state and federal regulatory authorities as a project representative or reviewing consultant, and has provided expert testimony in defense of a wetland boundary determination and as a municipal consultant at Massachusetts Department of Environmental Protection adjudicatory hearings. (Att. 3 a.3 Resumes)

8. PROJECT PARTNERS: Documented community and other support. (10 points)

Letters of support are attached from relevant public boards and committees, including:

Brewster Board of Selectmen, Brewster Conservation Commission, Department of Public Works, Brewster Comprehensive Water Planning Committee, Brewster Planning Board, Brewster Town Planner, Brewster Community Preservation Committee, Brewster Fire & Rescue Department, Brewster Police Department, Brewster Chamber of Commerce, and Brewster Recreation Department (Att. 5. Letters of Support)

LIST OF ATTACHMENTS:

Attachment 1: Maps:

a. Aerial View of Breakwater Landing
b. Massachusetts Shoreline Change Transects at Breakwater

Attachment 2: Plans

a. Proposed Maintenance to Existing Shorefront Protection for Lieb Residence (adjacent to west of Breakwater Landing & Beach)
b. Breakwater Conceptual Plan – Horsley Witten Group

Attachment 3: Budgets

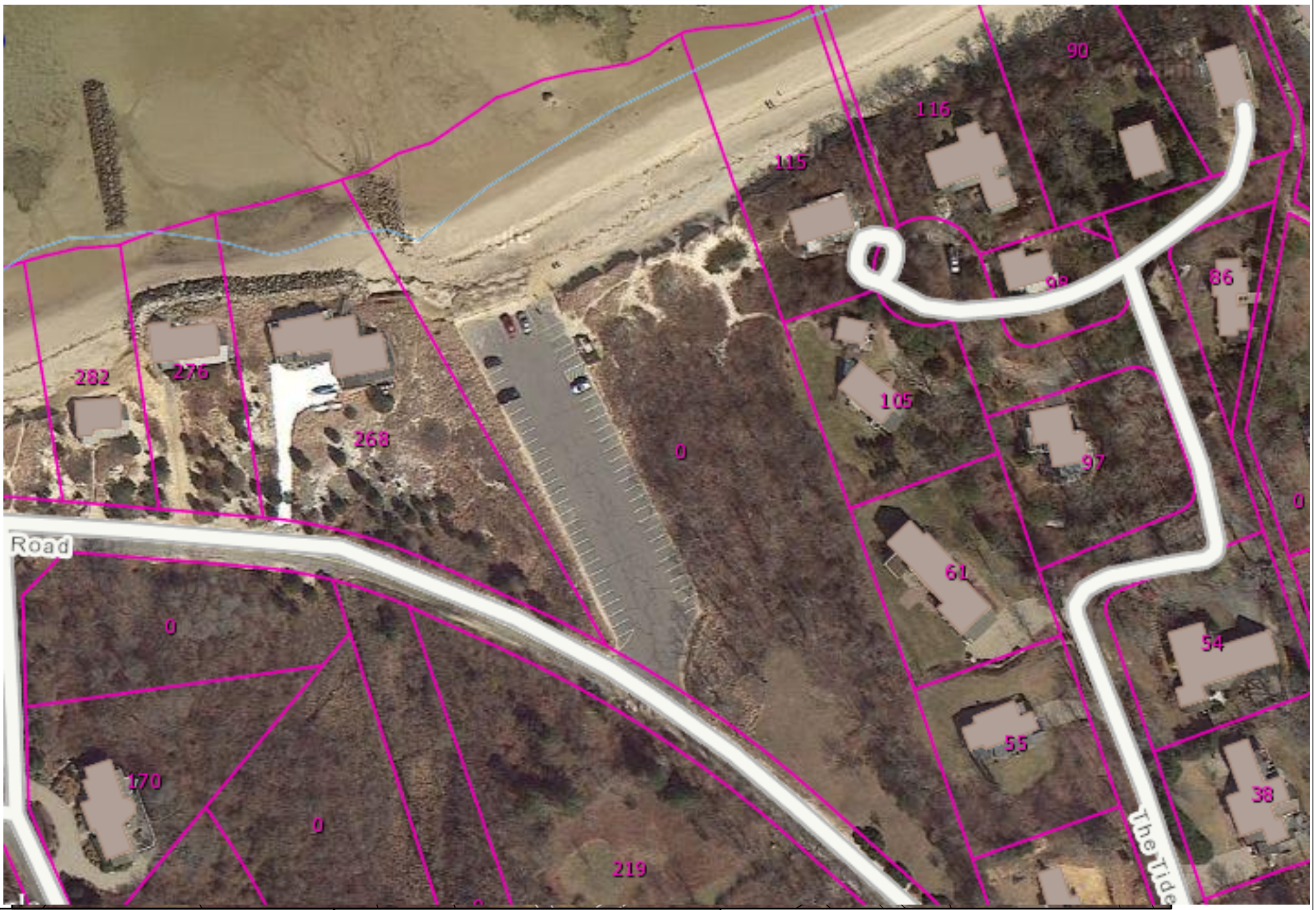
a. Horsley Witten Group (HWG)
    a.1. January 17, 2014 Retrofit Description & Estimate
    a.2. February 19, 2014 Revised Cost Estimate
    a.3. Resumes

Attachment 4: Site Photos

a. Parking lot of Breakwater Beach: fall 2013
b. Breakwater Beach: Jan 3, 2010
c. Rebuilding/replacing Artificial Dune: January 2010
d. Winter Storm Results: March 3, 2010
e. Stormwater Erosion: March 3, 2010
f. Dune Restoration with Brandeis Students April 2011
g. Dune Restoration with Brandeis Student April 2011
h. Photo During Storm: winter 2012/2013
i. Post Storm: winter 2012/2013
j. Beach Dune Erosion: winter 2012/2013
k. North End of Parking Lot: winter 2012/2013
l. March 7, 2013: Additional Storm Damage
m. March 26, 2014: Storm Debris
n. March 26, 2014: Storm wrack and Sand in Parking Lot
o. April 2, 2014: Rebuilding Sturdy Sand Fence
p. April 2, 2014 Section of Completed Fence

Attachment 5: Letters of Support

1a. Charles L. Sumner, Town Administrator – Match Acknowledgement, Town Meeting warrant article
1b. Charles L. Sumner, Town Administrator – Notarized Signature
2. Letters of Support:
    2a. Brewster Board of Selectmen
    2b. Paul C. Wightman, Chairman, Brewster Conservation Commission
    2c. Robert Bersin, Superintendent, Department of Public Works
    2d. Lemuel Skidmore, MS, MPH, Chair, Brewster Comprehensive Water Planning Committee
    2e. William C. Hoag, Chair, Brewster Planning Board
    2f. Susan M. Leven, AICP, Town Planner
    2g. Elliot G. Carr, Chair, Brewster Community Preservation Committee
    2h. Robert Moran, Chief, Brewster Fire & Rescue Department
    2i. Richard J. Koch, Jr., Chief, Town of Brewster Police Department
    2j. Ms. S. Kyle Hinkle, Executive Director, Brewster Chamber of Commerce
    2k. Ellen Bearse, Director, Recreation Department



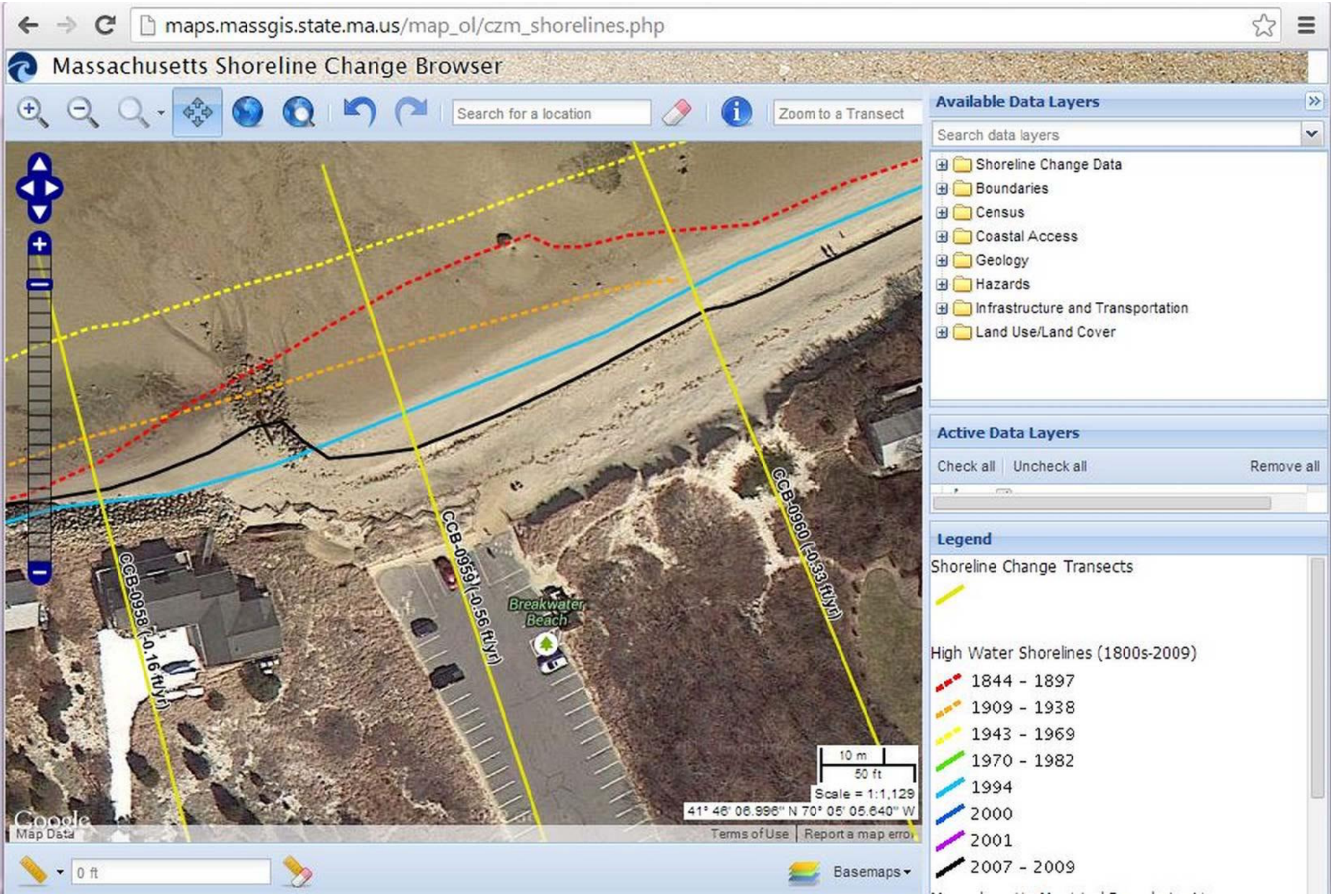
Town of Brewster
Conservation Department

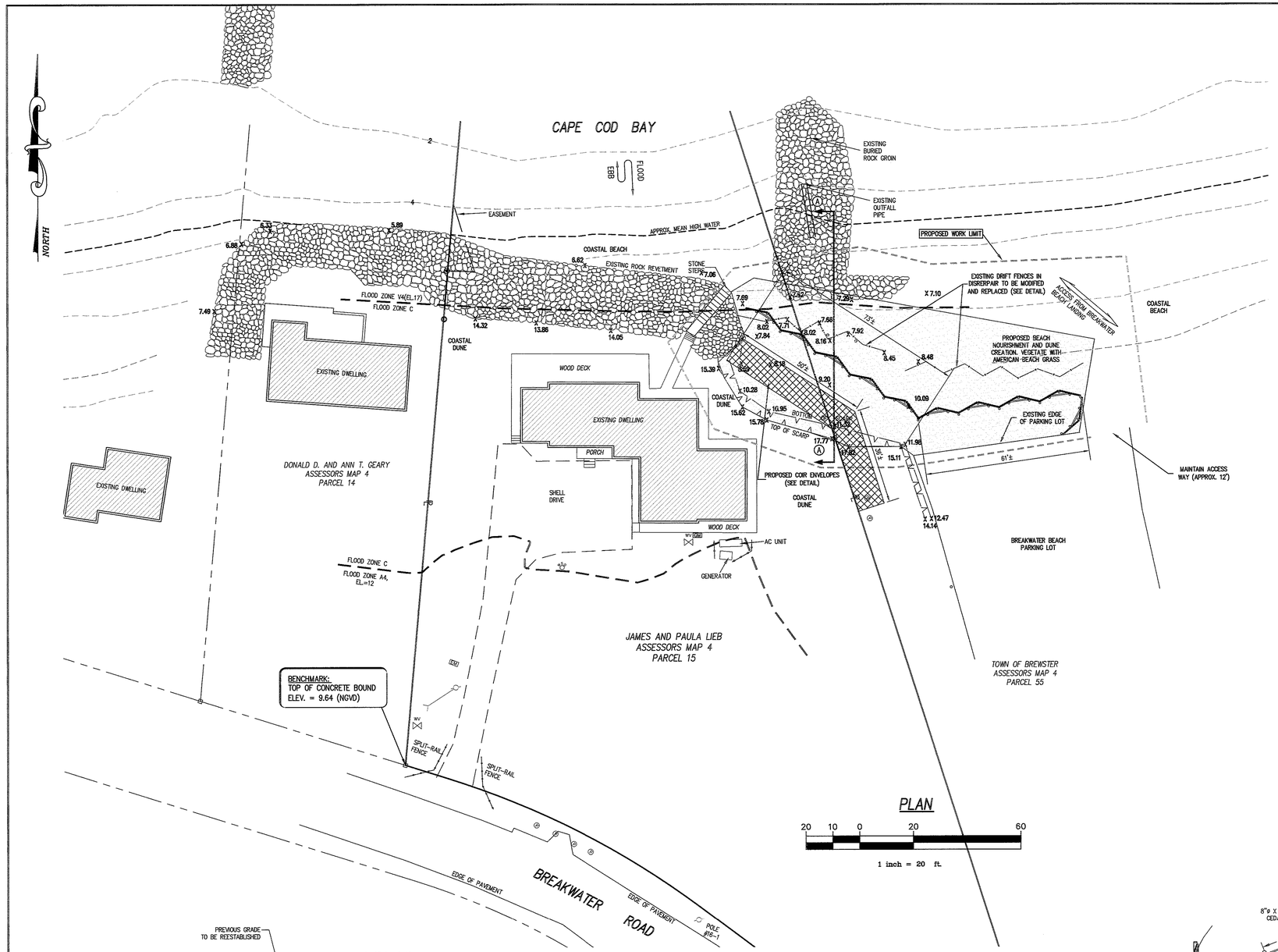
Breakwater

0 50 100 200
Feet

1 inch = 100 feet

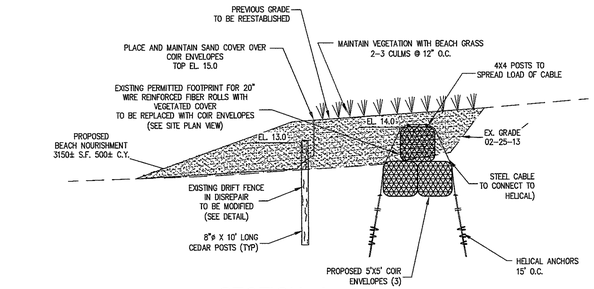
N


maps.massgis.state.ma.us/map_ol/czm_shorelines.php
Massachusetts Shoreline Change Browser
Search for a location
Zoom to a Transect
Available Data Layers
Search data layers
Shoreline Change Data
Boundaries
Census
Coastal Access
Geology
Hazards
Infrastructure and Transportation
Land Use/Land Cover
Active Data Layers
Check all
Uncheck all
Remove all
Legend
Shoreline Change Transects
High Water Shorelines (1800s-2009)
1844 - 1897
1909 - 1938
1943 - 1969
1970 - 1982
1994
2000
2001
2007 - 2009
CCB-0958 (-0.16 ft/yr)
CCB-0959 (-0.56 ft/yr)
CCB-0960 (-0.33 ft/yr)
Breakwater Beach
10 m
50 ft
Scale = 1:1,129
41° 46' 06.996" N 70° 05' 05.640" W
Google
Map Data
Terms of Use
Report a map error
0 ft
Basemaps



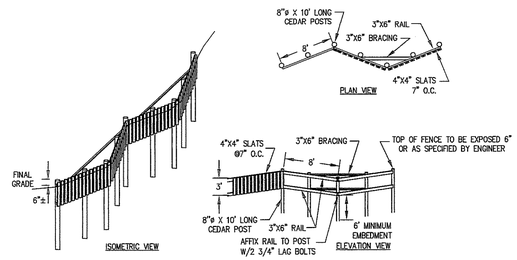
PLAN

1 inch = 20 ft.



SECTION A-A

SCALE 1" = 10'



TYPICAL DRIFT FENCE DETAIL

NOT TO SCALE

GENERAL NOTES:

1. SUPPLY ALL MATERIAL, EQUIPMENT AND LABOR FOR THE MAINTENANCE OF EXISTING SHOREFRONT PROTECTION ALONG THE SHOREFRONT AS DESCRIBED AND SHOWN ON PLAN AND DETAILS.

2. PERFORMANCE OF THE WORK SHALL BE IN COMPLIANCE WITH THE PLAN AND DETAIL, ORDER OF CONDITIONS ISSUED BY THE BREWSTER CONSERVATION COMMISSION FOR THE REFERENCED PROJECT, CONSTRUCTION PROTOCOL, AND AS DESCRIBED BELOW.

3. ACCESS TO BE FROM BREAKWATER BEACH LANDING ADJACENT TO THE OWNER'S PROPERTY FOR MATERIAL AND EQUIPMENT. UPON COMPLETION, ALL DISTURBED AREAS TO BE RE-GRADED AND RE-VEGETATED TO MATCH PRE-CONSTRUCTION CONTOURS.

4. ANY FILL MATERIAL REQUIRED SHALL BE CLEAN COMPACTED COARSE SAND BROUGHT ONTO SITE BY CONTRACTOR.

5. UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL REPLACE THE BEACH TO MATCH THE ORIGINAL PROFILE.

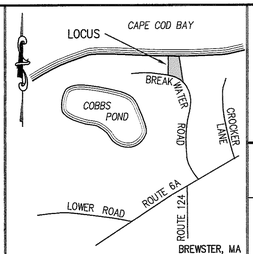
6. DISTURBED UPLAND AREAS TO BE PLANTED WITH VEGETATION INDIGENOUS TO THE ENVIRONMENT, SUCH AS BEACH GRASS AND ROSA RUGOSA, UPON COMPLETION OF WORK.

INSPECTION AND MAINTENANCE NOTES: (REFER TO INSPECTION AND MAINTENANCE PROTOCOL)

1. THE SAND DRIFT FENCE SHALL BE INSPECTED AND MAINTAINED OVER ITS SERVICEABLE LIFE. MATERIAL FOR THE DRIFT FENCE POSTS TO BE NON-LEACHING PRESSURE TREATED (ACQ), WHITE CEDAR, OR AS APPROVED BY ENGINEER. DRIFT FENCE BRACING SHALL BE NON PRESSURE TREATED LUMBER. ANY DAMAGED SECTIONS SHALL BE REPAIRED OR REPLACED.

2. THE BREWSTER CONSERVATION COMMISSION AGENT SHALL BE NOTIFIED PRIOR TO THE START OF ANY MAINTENANCE WORK.

3. THE BEACH NOURISHMENT SHALL COVER THE DRIFT FENCING UP TO 6".



KEY MAP
NO SCALE

PLAN REFERENCES:

ASSESSORS MAP 4 PARCEL 15
PLAN BOOK: 79 PAGE: 5
DEED BOOK: 9296 PAGE: 23
FIRM COMMUNITY PANEL #250003 0008 D

DATUM NOTE:

ELEVATIONS SHOWN HEREON ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD)

EXISTING SITE WORK PERMITTED UNDER FILE #SE9-1173 & SE9-1193

LEGEND

EXISTING

- BOUND
- GAS METER
- WV WATER VALVE
- IRRIGATION
- ELECTRIC METER
- MISC. SIGN
- UTILITY POLE
- GUY POLE
- GUY WIRE
- FENCE
- 10 CONTOUR
- x 10.09 SPOT GRADE 02/25/13

COASTAL ENGINEERING COMPANY, INC.
260 Cranberry Hwy. Orleans, MA 02653
508.255.6511 Fax: 508.255.6700

NO.	DATE	REVISION	BY
3	10-29-13	ADD SOUTHERLY RETURN AS DISCUSSED AT HEARING	JRN
2	10-15-13	REVISE COIR ENVELOPE FOOTPRINT	JRN
1	8-26-13	REVISE DRIFT FENCE DESIGN, REMOVE FILTER FABRIC	JRN

SEAL
COMMONWEALTH OF MASSACHUSETTS
ROGER PAUL MICHNIEWICZ
CIVIL
No. 30420
REGISTERED PROFESSIONAL ENGINEER
10/29/13

PROJECT
JAMES AND PAULA LIEB
268 BREAKWATER ROAD
BREWSTER, MA.

SHEET TITLE
PROPOSED MAINTENANCE TO EXISTING SHOREFRONT PROTECTION

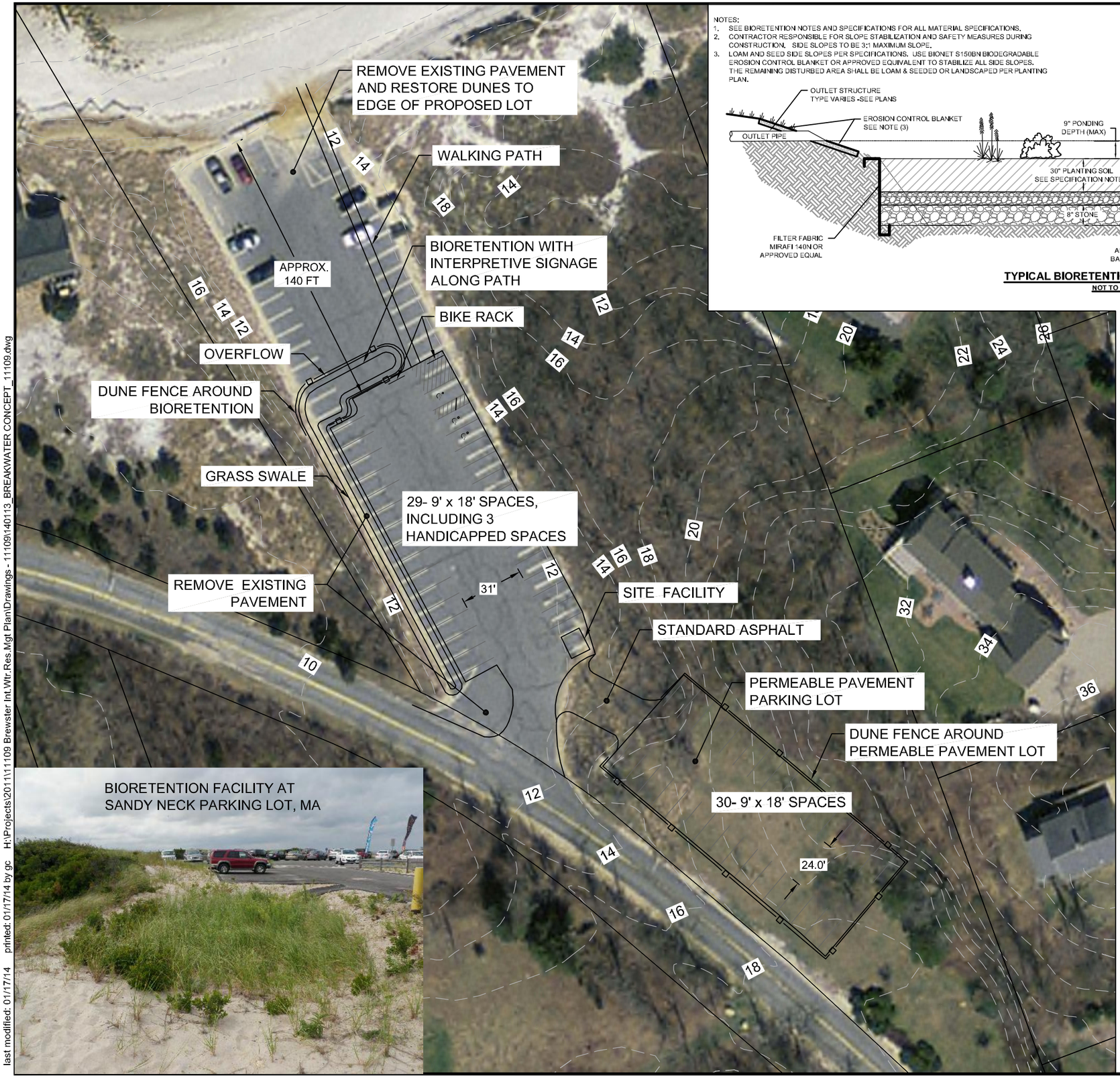
SCALE	AS NOTED
DRAWING FILE	C15765-rev 02-2013.dwg
DATE	~~6-14-13~~
DRAWN BY	KES
CHECKED BY	JRN

C3.1.1

1 OF 1 SHEETS

PROJECT NO. C15765

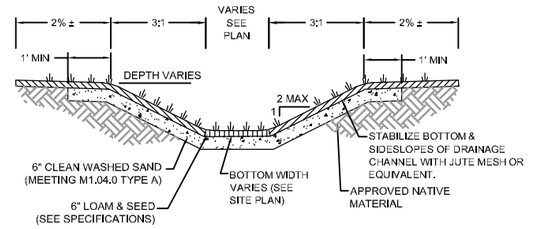
F:\SDSK\PROJECTS\C15765\C15765-rev 02-2013 Coir Envelopes.dwg Oct 29, 2013 - 10:54am



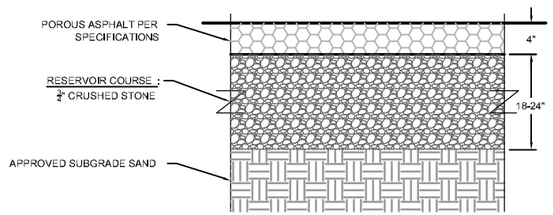
NOTES:
1. SEE BIORETENTION NOTES AND SPECIFICATIONS FOR ALL MATERIAL SPECIFICATIONS.
2. CONTRACTOR RESPONSIBLE FOR SLOPE STABILIZATION AND SAFETY MEASURES DURING CONSTRUCTION. SIDE SLOPES TO BE 3:1 MAXIMUM SLOPE.
3. LOAM AND SEED SIDE SLOPES PER SPECIFICATIONS. USE BIONET S150BN BIODEGRADABLE EROSION CONTROL BLANKET OR APPROVED EQUIVALENT TO STABILIZE ALL SIDE SLOPES. THE REMAINING DISTURBED AREA SHALL BE LOAM & SEEDED OR LANDSCAPED PER PLANTING PLAN.

TYPICAL BIORETENTION FACILITY DETAIL
NOT TO SCALE

NOTE:
CONTRACTOR SHALL SHAPE CHANNEL IN A PARABOLIC MANNER.



TYPICAL GRASS CHANNEL DETAIL
NOT TO SCALE



GENERAL NOTES:
1. SANDY-LOAM AND/OR LOAMY-SAND TOPSOIL MATERIAL SHALL BE EXCAVATED FROM ALL PAVED AREAS PRIOR TO SUB-BASE INSTALLATION.
2. SUB-GRADE (EXISTING MATERIAL) SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND/OR COARSE SAND, FREE FROM LOAM AND CLAY TO A DEPTH NOT LESS THAN 4-FT BELOW THE FINISH PAVEMENT SURFACE.
3. SUBGRADE FILL SHALL BE COMPACTED TO 95% COMPACTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. SEE SITE LAYOUT PLAN FOR PAVEMENT WIDTH AND LOCATION.
5. SEE GRADING PLANS FOR PAVEMENT SLOPE AND CROSS SLOPE.

TYPICAL POROUS ASPHALT CROSS-SECTION
NOT TO SCALE

GRAPHIC SCALE

50 0 25 50 100

(in feet)
1 INCH = 50 FEET

Revisions

No.	Date	By	Description
1	January, 2014	GSC	ACK

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

Drawn By: GSC
Checked By: ACK

BREAKWATER LANDING BEACH RESTORATION BREWSTER, MA

Plan Title: CONCEPT

Plan Date: January, 2014

Prepared For:
Town of Brewster
2198 Main St. (Route 6A)
Brewster, MA 02631
Phone: (508) 896-3701

Survey & Preliminary Layout Provided By:
Horsley Witten Group
90 Route 6A
Sandwich, MA 02563
Phone: (508) 833-6600
Fax: (508) 833-3150

Registration:

Project Number:

Sheet Number:
1 of 1

last modified: 01/17/14 printed: 01/17/14 by gc H:\Projects\2011\111109 Brewster Int.Wtr.Res.Mgt Plan\Drawings - 11109\140113_BREAKWATER CONCEPT_11109.dwg

Breakwater Landing
Town of Brewster, MA
Retrofit Concept
1/17/14

The parking lot at Breakwater Landing is subject to sand deposition and pavement deterioration due to shoreline erosion and rising sea levels.

Objective: Shoreline erosion has led to loss of dunes and deterioration of the parking lot. In fact, sand deposition has occurred 100 ft into the parking lot. The goal of this retrofit concept is to restore protective dune habitat, provide comparable parking amenities (maintain 59 spaces), improve beach access, and minimize the use and impact of impervious cover.

Description: The proposed retrofit concept consists of three main components as shown in the attached concept plan:

1. **Restoration of coastal habitat**
   Remove existing pavement (~10,300 sf) within 140 ft of beach. Actively restore, or allow for passive re-establishment, of a majority of this area back to a dune ecosystem. Depending on the Town's objectives, active restoration may include bringing in sand from offsite (or possibly from excavated material at overflow parking—see below), installation of dune fencing, and/or the planting of appropriate vegetation (e.g., American Beach grass, Beach Plum, Bayberry, and Sea-side Goldenrod). A boardwalk or trail connecting the beach and the parking lot should be integrated with the restoration design, as well as a bioretention facility (see below) and interpretive signage. Dune restoration and access path construction are not included in the total cost estimate at this time.

2. **Retrofit of existing parking lot**
   Remove ~2,800 sf of existing pavement along the western edge of the remaining parking lot (~15 ft x 150 ft-strip) and replace with a grass swale that will be used to convey road and parking lot runoff into a bioretention facility. These BMPs should be sized to manage at least 1"of runoff and will be planted with beach-appropriate grasses, shrubs, and ground cover. A curb cut and paved flume will be used at the channel inlet, and a simple spillway would be provided for overflow from the bioretention cell (frequent overflow is unlikely given the sandy soils). Interpretive signage should be posted near the bioretention and trail access. The parking area would be restriped to accommodate at least 29 parking spaces (9 ft x18 ft) including 3 handicapped spaces and at least two bike racks. The drive aisle width would be between 24 ft and 31 ft (shown at 31 ft); a narrower width would provide more flexibility in the swale design. A location for trash dumpster/restroom facilities could be provided closer to the main entrance.

3. **Addition of pervious overflow parking:**
   Construct an overflow parking lot (~ 8,600 sq ft) in the existing meadow located in the southeast portion of property. This parking area is proposed to be constructed with pervious asphalt and designed for 30 parking stalls (9 ft x18 ft) with a 24 ft drive aisle width. At an average elevation of 20 ft and native sandy subsoils, only a 18-24 inch- reservoir course would be required below the

porous asphalt layer (cost estimate assumes 18 inch). Access to the overflow lot will be through a standard asphalt egress off of the existing entrance. Interpretive signage should be posted near the entrance to the overflow parking lot.

Cost Estimate: This is a planning level cost estimate for 10% concept design for the purposes of completing a grant request application. Dune restoration and access path construction are not included in the total cost estimate at this time.

Item	Description	Cost Estimate
Construction Contract	Pavement removal; construction of stormwater BMPs; grading and construction for over flow parking lot and entrance; erosion control; pavement markings; interpretive signage; dune fencing; and bike racks; includes 30% contingency	$116,000
Engineering and Permitting	25% of construction costs; includes site survey & engineering; assumes extensive permitting due to wetland/beachfront location; certificate of compliance	$29,000
Construction Admin	~5% of construction costs; including site visits at key aspects of construction; review shop drawings and submittals; respond to RFIs; project closeout and as-built drawing review	$10,000
Dune Habitat Restoration	Not included due to uncertainties associated with Town preferences (e.g., active restoration of 5 ft dunes which would require renourishment vs allowing natural re-establishment; use of volunteers, etc)	--
Total		**$155,000**

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

MEMORANDUM

DATE: February 19, 2014

TO: Chris Miller

FROM: Anne Kitchell Horsley Witten Group, Inc (HW).

RE: Revised cost estimate for design and permitting of proposed Breakwater Landing retrofit and dune restoration project

Per your request, this memo provides a cost estimate of **$40,000** to be used in preparation of a proposal for the COASTAL COMMUNITY RESILIENCE GRANT PROGRAM FY14 grant. In generating this estimate, we assumed the following based on your 2/12/14 email:

1. HW services include 100% design, permitting, and preparation of bid documents for the retrofit of Breakwater Landing (based on our 1/17/14 concept sketch), as well as permitting for the dune restoration and beach access component as described in your email. Design and bid document preparation for the dune restoration and access component will be completed by another firm.
2. This estimate includes site survey and engineering design, permitting, and preparation of bid documents (Town to provide upfront material) and specifications.
3. The proposed project will result in activities within coastal dunes, a regulated resource area under the Massachusetts *Wetlands Protection Act* (M.G.L. Ch. 131 § 40) and the Code of the Town of Brewster Wetlands Protection, Chapter 172, *Brewster Wetlands Protection By-law*. The project will require permitting (Order of Conditions) through the local Conservation Commission and the Massachusetts Department of Environmental Protection (DEP) under a Notice of Intent (NOI) application. This estimate does not include any additional State-issued Permit or State agency review under the Massachusetts Environmental Policy Act (M.G.L. c. 30 §§ 61 through 62H, inclusive or MEPA) through an Environmental Notification Form (ENF). Based upon our understanding of the project, it does not appear that mandatory review through an Environmental Impact Report (EIR) would be required.
4. This estimate does not include construction or construction admin for the purposes of the CCR Grant.
5. There are two items listed in your project description that are included within this proposal--participation in at least one public meeting and preparation of a recommended maintenance plan for Breakwater Landing stormwater BMPs.

6. We assume Rich Claytor, P.E. would be the Principal and quality control; Michelle West, P.E. would be the Project Manager and Design Engineer, and Amy Ball will take the lead on permitting and associated dune habitat restoration. Resumes are attached.

Please let us know if HW can provide support for other tasks listed in your proposal (e.g., mapping and graphic design/production for Atlas). Thank you for the continued opportunity to assist the Town in your endeavors and good luck with your application.

Richard A. Claytor, Jr., P.E.

President

Horsley Witten Group
Sustainable Environmental Solutions

Areas of Expertise

- Wetland and Natural Resource Area Assessments
- Environmental Permitting & Compliance
- Smart Growth/ Low Impact Development
- Watershed Planning & Assessment
- Civil Engineering
- Environmental Engineering
- Stormwater Management
- Surveying
- Site Design
- Training

Professional Registrations

- Professional Engineer Massachusetts, New Hampshire, New York, and Maryland
- Massachusetts Certified Soil Evaluator
- LEED Accredited Professional

Professional Affiliations

- Massachusetts DEP Stormwater Policy Advisory Committee
- Town of Sandwich, Massachusetts Planning Board, 2007 to 2011
- American Society of Civil Engineers

Academic Background

Bachelor of Science, Union College, Civil Engineering, Concentration in Hydrology, Hydraulics, Water Resources, and Geotechnical Engineering

Rich Claytor has more than 30 years of practical experience in civil and environmental engineering with specific expertise in water resource planning, design, implementation, research, education, and training. Rich has extensive experience and expertise in stormwater management design, implementation, program assessment, policy and evaluation. Rich also is experienced in watershed planning, training and education; water resource permitting and research; water supply and wastewater design; land use planning, site design and research; storm drainage, erosion/sediment control, roadway design; and construction administration. He has authored a variety of stormwater manuals and publications on stormwater policy, design and implementation, and presented at dozens of training workshops and conferences over the last two decades. He has served as the principal designer of stormwater management and stream restoration measures for a wide range of projects throughout New England and the Mid Atlantic.

REPRESENTATIVE PROJECTS

Roger Williams Park Water Quality Improvement Plan, Providence, RI: Principal Engineer for this EPA funded restoration project to improve the water quality and biodiversity conditions of the Park's urban ponds. The focus of this project is on the development of a water quality improvement plan to include a watershed assessment including pollutant-loading analyses, the establishment of long- and short-term water quality goals, identification of feasible stormwater retrofits, assessment of in-pond treatment options, and design, permitting, and construction administration of the five highest priority stormwater retrofit BMPs.

Bridgewater State University West Campus Parking Improvements, Bridgewater, MA: Principal-in-Charge for design and construction administration for a 340 space parking and open space improvement project that included environmental permitting, plan and specification documents and construction oversight. The stormwater management system serving the project was designed to incorporate a series of low impact development treatment systems and incorporated stormwater monitoring components for use by the University in their science courses curriculum.

Low Impact Design Stormwater Retrofit for Perkins Street, Peabody, MA: Principal-in-Charge for the assessment and design for three separate low impact development retrofit sites to help alleviate localized flooding, enhance water quality, and improve safety conditions at the intersection of Perkins Street and Allens Lane. The Plan includes a variety of innovative, feasible and cost-effective stormwater practices constructed on publically-owned park land and rights-of-way.

Samoset Street Outfall Assessment and Engineering, Plymouth, MA: Lead Design Engineer for the completion of comprehensive stormwater management improvements for the Town. The Samoset Street outfall discharges into historic Plymouth Harbor, a 303(d) listed impaired water body. Rich directed the assessment of existing road drainage conditions,

water quality sampling, soil evaluation, and design of roadway stormwater improvements and several BMPs.

Centennial Park Detention Basin Retrofit and Wetland Restoration, Peabody, MA: Principal-in-Charge for this project to develop a restoration plan that improves the wetland function and provide enhanced stormwater management for the Centennial Park Industrial Park, an area that often experiences severe flooding. Services include: design plans, environmental permitting, and assistance with construction bidding, project management, and oversight.

Bare Hill Pond Village Stormwater Master Plan and Implementation, Harvard, MA: Principal Engineer for the identification, assessment, prioritization, design and implementation of more than a half-dozen "green infrastructure" control measures to retrofit stormwater management for the 100 acre village center of Harvard, MA. Measures included an off-line submerged gravel wetland for enhanced phosphorus treatment.

Roadway Drainage Improvements and Stormwater Treatment, Plymouth, MA: As part of a municipal capital improvements program, with additional funding from the Massachusetts 319 Non-Point Source Grant Program, Rich directed the development of construction-ready plans and specifications for three water quality treatment sites and seven roadway stormwater and traffic improvement projects throughout the Town.

Brackett Landing Mixed Use Development, Eastham, MA: Principal-in-Charge for the planning, design and permitting of this small-scale traditional neighborhood design (TND) project in the Town of Eastham, Massachusetts. The project incorporates a mix of commercial and residential lands uses, a village common, and a pedestrian-friendly streetscape within the context of LID stormwater management and advanced nitrogen removing wastewater management. Permits for water supply, wastewater and stormwater management were secured though the Town of Eastham, and the Massachusetts Department of Environmental Protection.

Chepachet Village Integrated Water Management Planning and Design, Glocester, RI: Project Manager for a village scale wastewater and stormwater management study in Chepachet Village, Glocester, RI. This project evaluated existing water management problems and developed neighborhood-scale solutions designed to address flooding and water quality issues. Under his supervision, HW designed and oversaw the installation of the first constructed stormwater wetlands designed to meet the criteria of the 2010 RI Stormwater Design and Installation Standards Manual.

Thornton Burgess Society's Green Briar Nature Center, Sandwich, MA: Lead designer for the site design to accommodate a new educational building. Rich directed the design of a new gravel parking lot and paved driveways for the new educational building. The project included the design of three bioretention facilities, a water quality swale and permeable pavers in overflow parking areas. HW prepared construction-ready plans and specifications, secured all relevant permits and provided construction administration services. The firm continues to provide technical guidance and oversight on the maintenance of the LID system for the Thornton Burgess Society.

Sawmill Pond Watershed Plan, North Kingstown, RI: Principal-in-Charge for the preparation of a comprehensive watershed management plan to improve surface and ground water quality in Sandhill Brook and Sawmill Pond. The project includes a stormwater management assessment for the project area, identifying and conceptually designing stormwater retrofit facilities at key locations throughout the watershed. These concepts were used to obtain grant funding, and are scheduled to be constructed in 2013.

Horsley Witten Group
Sustainable Environmental Solutions

Michelle L. West, P.E.

Project Manager - Water Resources Engineer

Areas of Expertise

- Smart Growth/ Low Impact Development
- Watershed Planning & Assessment
- Geographic Information Systems
- Civil Engineering
- Environmental Engineering
- Stormwater Management
- Site Design
- Low Impact Design
- Training
- Meeting Facilitation

Professional Registrations

- Professional Engineer, MI

Professional Affiliations

- Member, Conservation Commission, Town of Falmouth, 2007 to Present
- Waquoit Bay National Estuarine Research Reserve, Volunteer

Academic Background

Master of Science, Engineering, College of Civil and Environmental Engineering, University of Michigan

Bachelor of Science, Engineering, College of Civil and Environmental Engineering, University of Michigan

Bachelor of Science, School of Natural Resources and Environment, University of Michigan

Michelle West, P.E., has twelve years of professional experience in civil and environmental engineering. Her specific expertise is in stormwater management, watershed planning, hydraulic/hydrologic modeling, and low impact development (LID) planning, assessment, design, and implementation. She has prepared materials for and presented at several technical training workshops on stormwater issues, LID, and erosion and sediment control (ESC). She also has experience with public education and outreach, particularly as part of municipal NPDES Phase II stormwater plan implementation, as well as with geographic information system (GIS) mapping, analysis, and modeling.

REPRESENTATIVE PROJECTS

Stormwater Assessment for Bare Hill Pond, Harvard, MA: Performed a watershed assessment and provided recommendations for stormwater retrofits for eight target drainage areas tributary to Bare Hill Pond, which suffers from high nutrient and sediment loadings, as well as invasive vegetation. Designed LID practices such as gravel wetlands, swales, and bioretention facilities to help reduce pollutant inputs to the pond. Six of the practices were constructed in 2010, with two more completed in Spring 2013.

Pilot Project for Meeting the Charles River Phosphorus TMDL for the Spruce Pond Subwatershed, Franklin, MA: In cooperation with the Charles River Watershed Association, HW provided technical assistance and engineering support to identify restoration approaches to restore hydrologic integrity and develop stormwater "green infrastructure" retrofit concepts for the Spruce Pond Watershed. Michelle was the Project Engineer, providing the following services: training for CRWA staff on how to conduct a retrofit inventory; field reconnaissance to identify retrofit sites; evaluation and conceptual design and cost estimates for retrofit options; site selection support; and technical peer review of CRWA's assessment report.

Herring Brook Stormwater Improvements Project, Weymouth, MA: The Massachusetts Division of Marine Fisheries identified adverse impacts on the herring and smelt habitat in Herring Brook due, in part, to excessive sediment loading from stormwater discharges. Michelle conducted a watershed assessment of the 550-acre urbanized study area using GIS and field reconnaissance. This assessment was used to identify the most effective locations for stormwater retrofits and most appropriate practice at each location. She was the lead engineer on the BMP design for the top three priority sites, including an underground sand filter and two gravel wetlands.

Stormwater Retrofit Fieldwork and Assessment for Peconic Estuary, Long Island, NY: Performed a watershed field assessment and provided recommendations for stormwater retrofits to address

water quality issues in four pilot watersheds in the Peconic Bay Estuary region. Conceptually designed management practices such as stormwater wetlands, swales, sand filters, and bioretention facilities and ranked projects to aid local communities with implementing the most cost effective and beneficial projects with limited funds. Prepared watershed assessment guide to support plan development for remaining watersheds in the area.

Chepachet Village Integrated Water Management Planning and Design, Glocester, RI: Michelle was a Project Engineer for this village-scale wastewater and stormwater management study in Chepachet Village, Glocester, RI. The goal of this study was to resolve existing water management issues, using neighborhood-scale solutions designed to address flooding and water quality issues. Michelle developed a conceptual design of innovative stormwater solutions for village roadways, incorporating grassed swales, bioretention systems, infiltration basins, and wet vegetated treatment systems into the existing stormwater management system. In 2012, the wet vegetated treatment system concept was fully designed and constructed, integrating stormwater management with the surrounding parkland, historical sites, and wetland areas.

Savin Hill Cove Sediment Erosion and Transport Assessment, Boston, MA: Michelle conducted an assessment of potential erosion and scour in Savin Hill Cove resulting from proposed changes in stormwater discharge from improvements associated with the Morrissey Boulevard Drainage Conduit Project. She evaluated in-channel flows and velocities in the cove using the Storm Water Management Model (SWMM) RUNOFF module and US Army Corps of Engineers Hydrologic Engineering Center River Analysis System (HEC-RAS) model.

Upper Charles River Sustainable Stormwater Funding Assessment, Bellingham, Franklin, & Milford, MA: Project engineer for the assessment and dissemination of a technical report documenting the feasibility of widespread implementation of stormwater control measures to meet TMDL requirements and the requirements for a sustainable funding source through a Stormwater Utility structure.

Roger Williams Park, Providence, RI: Project engineer for this EPA funded restoration project to improve the water quality and biodiversity conditions of the Park's urban ponds. The focus of this project was on the development of a water quality management plan to include a watershed assessment including pollutant-loading analyses, the establishment of long- and short-term water quality goals, identification of feasible stormwater retrofits, assessment of in-pond treatment options, and design, permitting, and construction administration of the five highest priority stormwater retrofit BMPs.

Rhode Island Stormwater Design and Installations Manual Update and LID Site Planning and Design Guidance for Communities: Lead Engineer for this project that updated the statewide Rhode Island Stormwater manual to incorporate LID practices for all new and redevelopment projects. This strategy integrated site design criteria with structural stormwater practices for the first time to create a comprehensive stormwater management approach. She developed and presented training workshops for agency staff, as well as for engineers and developers, to describe the new manual and introduce new concepts. She also helped prepare a companion guidance document for Rhode Island municipalities that facilitates the implementation of LID at the local level.

Feasibility Study and Conceptual Design for Affordable Housing, Falmouth and Marion, MA: Assisted with site evaluation and conceptual design for town-owned property in Falmouth and Marion. Feasibility criteria included assessing wetlands, identifying priority habitat areas, and evaluating wastewater and stormwater issues. Site layouts minimize impervious surfaces, preserve open space, and incorporate LID stormwater management practices such as bioretention facilities and infiltration systems. Attended public hearings to present alternative concepts and gather feedback from the community.

Horsley Witten Group
Sustainable Environmental Solutions

Amy Miller Ball, CWS

Project Manager - Senior Ecologist

Areas of Expertise

- Wetland & Natural Resource Area Assessments
- Environmental Permitting & Compliance
- Rare Species
- Coastal Resources
- Training
- Meeting Facilitation

Professional Registrations

- Certified Wetland Scientist, (C.W.S.) No. 230, NH

Professional Affiliations

- Board of Directors, V.P. for Education, MA Association of Conservation Commissions (MACC)
- Member, Society of Wetland Scientists (SWS)
- Member, Association of MA Wetland Scientists (AMWS)

Academic Background

Master of Science, Plant Biology, University of Massachusetts

Bachelor of Science, Biology, Muhlenberg College

Wetlands Wildlife of Southeastern MA Field Course, University of Massachusetts Cooperative Extension

Marine Phycology Summer Field Course, University of Washington

Barrier Island Ecology Summer Field Course, Duke University

Amy Ball has more than 18 years of professional experience as a wetlands scientist and ecologist specializing in wetland botany and ecology, rare species and wildlife habitat assessments, wetland restoration and mitigation, environmental assessment and monitoring, and environmental policy evaluation. As a project manager and senior ecologist with the Horsley Witten Group, Ms. Ball manages projects requiring inland and coastal wetland resource area determinations, wildlife habitat assessments, impact mitigation, and regulatory compliance. Ms. Ball also manages project permitting for projects requiring federal, state, regional, and local permits pursuant to laws, regulations, and policies governing water resource and rare species protection. Ms. Ball frequently appears before local conservation commissions and state and federal regulatory authorities as a project representative or reviewing consultant, and has provided expert testimony in defense of a wetland boundary determination and as a municipal consultant at Massachusetts Department of Environmental Protection adjudicatory hearings.

REPRESENTATIVE PROJECTS

Provincetown Municipal Airport, Provincetown, MA (on-going): Project manager for wetlands and wildlife components associated with the implementation of the Airport's Capital Improvement Program. Project involvement includes wetland delineation of freshwater and coastal resource areas, wildlife habitat assessments, and rare species habitat surveys for four Massachusetts- listed species, as well as assisting in the preparation of various reports and public presentations. Responsible for assisting project team with permitting and coordination with Federal, State, Regional and local regulatory agencies. Required permits and review include: Section 404 Individual Permit and Section 401 Water Quality Certification (WQC) under the Federal Clean Water Act; Coastal Zone Management (CZM) Consistency Review; a Decision from the Cape Cod Commission Development of Regional Impact; MESA Project Review under the Massachusetts Endangered Species Act (MESA); and an Order of Conditions under the Massachusetts Wetlands Protection Act, in addition to review under the National Environmental Policy Act (Environmental Assessment) and the Massachusetts Environmental Policy Act.

Sandy Neck Beach Facility, Barnstable, MA: Project manager responsible for permitting the reconstruction of the existing bathhouse and concession stand, construction of a storage garage, and extension of a walking path to improve safety conditions along Sandy Neck Road. Environmental constraints, including numerous coastal and freshwater resource areas and rare species habitat within a Massachusetts designated Area of Critical Environmental Concern (ACEC) presented design challenges for the design team and the Town to present an

environmentally sound project design that is sensitive to the delicate ecosystem while meeting the needs of the Town to provide an enjoyable and educational beach facility. Permitting requirements included obtaining an Order of Conditions under the state and local wetlands laws as well as review under the Massachusetts Endangered Species Act.

Fuller Brook Park Preservation Project, Wellesley, MA (on-going): Wetlands permitting manager for the rehabilitation of Fuller Brook Park including improvements to an existing multi-use path, and a series of mitigation of measures to restore habitat and hydrologic function to Fuller Brook and its tributaries. Permitting and review required through several federal, state, and local regulatory agencies including a waiver for the use of herbicides on select non-native invasive species on Town-owned property.

Permitting for Stormwater Retrofit Projects, Peabody, MA: As part of a comprehensive City-wide flood management and stormwater improvements project, Ms. Ball was responsible for local, state, and federal wetlands permitting of targeted LID retrofit projects in several locations throughout the City of Peabody. Retrofit sites to date include four locations within existing but unmaintained detention basins within an industrial park, and one within a brownfields site in the downtown area, each posing particular permitting complications, requiring careful coordination between the City, the project team, and the permitting agencies. Some of the retrofit projects permitted during earlier phases of this master plan project were constructed in 2010.

Eel River Headwaters Restoration Project, Plymouth, MA: Responsible for wetlands permitting at the State, Federal, and local levels for the precedent-setting restoration effort within the headwaters of the Eel River. Restoration efforts include converting approximately 40 acres of retired commercial cranberry bogs to a natural riparian wetland system and removing a portion of an historic stone sawmill dam, and converting these areas into critical wetland and cold-water stream habitat. Restoration will create a more natural hydraulic gradient, improving fish passage and overall water quality within the Eel River. Permits included: Section 404 Programmatic General Permit (PGP) under the Federal Clean Water Act; CZM Consistency Review; and an Order of Conditions under the Massachusetts Wetlands Protection Act, in addition to review under National Environmental Policy Act and the Massachusetts Environmental Policy Act.

Bass Creek, Yarmouth, MA: On behalf of the Town of Yarmouth Massachusetts Wetland Restoration Program (MWRP), responsible for coordinating permitting at the State, Federal, and local levels for the restoration of approximately 35 acres of salt marsh by enhancing tidal influence to a degraded salt marsh along Bass Creek, and restoring a more native plant community and improved water quality. Permits included: Section 404 (PGP) and Section 401 (WQC) permitting under the Federal Clean Water Act; CZM Consistency Review; a Chapter 91 Waterways License; MESA Project Review under MESA; and an Order of Conditions under the Massachusetts Wetlands Protection Act, in addition to review under the Massachusetts Environmental Policy Act.

4a.The parking lot at Breakwater Landing is subject to sand deposition and pavement deterioration due to shoreline erosion and rising sea levels.

4b. Breakwater Beach January 3, 2010

4c. Breakwater –Rebuilding/replacing the artificial dune in January 2010

4d. Breakwater March 3, 2010. Winter storms removed remnants of dune north end of parking lot, causing the lot to be undermined. January 2010, sand was placed to provide additional protection for the remainder of the winter. The sacrificial dune was destroyed; additional parking area was lost. The parking lot elevation is low, and unless protected, we may expect additional loss of pavement each year, in part due to the lack of sediment transport from further west (revetments and groins).

4e. March 3, 2010: Stormwater currently collects in the northwest corner of the lot, causing erosion of the dune as it moves north onto the beach. At times this forms a deep very large puddle, forcing a hole through the dune over time. The grant proposal would eliminate the direct stormwater discharge onto the beach, reduce the volume of stormwater generated, and treat the stormwater through natural bio-swales or porous pavement.

4f. Breakwater Dune Reconstruction with Brandeis University Student Volunteers, April 2011

4g. Breakwater Dune Reconstruction with Brandeis University Student Volunteers, April 2011

4h. Winter 2012/2013: Photo during storm; waves impacting parking area. Wire in foreground is from (former) coir logs at north end of parking area at property to west (Lieb).

4i. Winter 2012/2013: Post storm parking area looking north.

4j. Winter 2012/2013: Photo at beach looking east. Extensive erosion to dunes.

4k. Winter 2012/2013: Looking southeast at north end of parking lot. Protective dune, sturdy sand fence, coir logs and beach grass plantings eroded away and north end of pavement is gone.

4l. March 7, 2013 showing additional storm damage to northern end of Breakwater Landing. Dune subsequently rebuilt.

4m. March 26, 2014 storm left debris, wrack and eroded sand from base of dune at sturdy sand fence located at north end of parking lot at Breakwater.

4n. March 26, 2014 storm left wrack and wind and wave born sand into paved parking area at Breakwater.

4o. April 2, 2014 rebuilding sturdy sand fence and dune at north end of Breakwater Landing. Beach grass planting to be completed later in the week.

4p. April 2, 2014 Section of completed sturdy sand fence(green oak timbers) prior to burying with beach sand. Note coir envelope protecting adjacent house west of landing. See Coastal Engineering plan for Lieb and Breakwater (Att. 2.a.).

Town of Brewster

2198 Main Street
Brewster, MA 02631-1898
Phone: (508) 896-3701
Fax: (508) 896-8089

Office of:

Board of Selectmer
Town Administrato

March 17, 2014

Julia Knisel
Coastal shoreline & Floodplain Manager
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: The Town of Brewster's *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* proposal to the Green Infrastructure for Coastal Resilience Pilot Grant Program ENV 14 CZM 07

Dear Ms. Knisel,

Please be advised that, I, Charles L. Sumner, am the authorized signatory for the Town of Brewster.

The Town commits to match 25% of the total Coastal Community Resilience Grant project's costs and acknowledges that funding is to be provided by the state on a reimbursement basis.

Matching funds are in the process of being approved by Brewster's authorizing body, Town Meeting. (Please see attached Article for May 2014 Town Meeting)

Sincerely,

Charles L. Sumner
Town Administrator

Att. Town Meeting Article

Issued May 2004

COMMONWEALTH OF MASSACHUSETTS
CONTRACTOR AUTHORIZED SIGNATORY LISTING

CONTRACTOR LEGAL NAME :
CONTRACTOR VENDOR/CUSTOMER CODE:

PROOF OF AUTHENTICATION OF SIGNATURE

This page is optional and is available for a department to authenticate contract signatures. It is recommended that Departments obtain authentication of signature for the signatory who submits the Contractor Authorized Listing.

This Section MUST be completed by the Contractor Authorized Signatory in presence of notary.

Signatory's full legal name (print or type): Charles Lorne Sumner

Title:Town Administrator

X _____

Signature as it will appear on contract or other document (**Complete only in presence of notary**):

AUTHENTICATED BY NOTARY OR CORPORATE CLERK (PICK ONLY ONE) AS FOLLOWS:

I, Colette M Williams (NOTARY) as a notary public certify that I witnessed the signature of the aforementioned signatory above and I verified the individual's identity on this date:

March 17, 20 14.

My commission expires on: May 27, 2016

COLETTE M. WILLIAMS
JUSTICE OF THE PEACE
Commonwealth of Massachusetts
My Commission Expires
May 27, 2016

AFFIX NOTARY SEAL

I, _____ (CORPORATE CLERK) certify that I witnessed the signature of the aforementioned signatory above, that I verified the individual's identity and confirm the individual's authority as an authorized signatory for the Contractor on this date:

_____, 20 _____.

AFFIX CORPORATE SEAL

Issued May 2004

COMMONWEALTH OF MASSACHUSETTS
CONTRACTOR AUTHORIZED SIGNATORY LISTING

CONTRACTOR LEGAL NAME :
CONTRACTOR VENDOR/CUSTOMER CODE:

INSTRUCTIONS: Any Contractor (other than a sole-proprietor or an individual contractor) must provide a listing of individuals who are authorized as legal representatives of the Contractor who can sign contracts and other legally binding documents related to the contract on the Contractor's behalf. In addition to this listing, any state department may require additional proof of authority to sign contracts on behalf of the Contractor, or proof of authenticity of signature (a notarized signature that the Department can use to verify that the signature and date that appear on the Contract or other legal document was actually made by the Contractor's authorized signatory, and not by a representative, designee or other individual.)

NOTICE: ***Acceptance of any payment under a Contract or Grant shall operate as a waiver of any defense by the Contractor challenging the existence of a valid Contract due to an alleged lack of actual authority to execute the document by the signatory.***

For privacy purposes **DO NOT ATTACH** any documentation containing personal information, such as bank account numbers, social security numbers, driver's licenses, home addresses, social security cards or any other personally identifiable information that you do not want released as part of a public record. The Commonwealth reserves the right to publish the names and titles of authorized signatories of contractors.

AUTHORIZED SIGNATORY NAME	TITLE
Charles L. Sumner	Town Administrator

I certify that I am the President, Chief Executive Officer, Chief Fiscal Officer, Corporate Clerk or Legal Counsel for the Contractor and as an authorized officer of the Contractor I certify that the names of the individuals identified on this listing are current as of the date of execution below and that these individuals are authorized to sign contracts and other legally binding documents related to contracts with the Commonwealth of Massachusetts on behalf of the Contractor. I understand and agree that the Contractor has a duty to ensure that this listing is immediately updated and communicated to any state department with which the Contractor does business whenever the authorized signatories above retire, are otherwise terminated from the Contractor's employ, have their responsibilities changed resulting in their no longer being authorized to sign contracts with the Commonwealth or whenever new signatories are designated.

Signature

Date: March 17, 2014

Title: Town Administrator

Telephone: 508-896-3701

Fax: 508-896-8089

Email:csumner@town.brewster.ma.us

[Listing can not be accepted without all of this information completed.]

A copy of this listing must be attached to the "record copy" of a contract filed with the department.

March 18, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

RE: Letter of support for the Town of Brewster's proposal Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

The Brewster Chamber of Commerce mission is to "strengthen and promote the economic feasibility, cultural richness, social needs and environmental sensitivity" of Brewster. To that end, we are pleased to support the Town of Brewster proposal "Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach".

Businesses on Cape Cod recognize that the environment is our economy. This project will contribute to the preservation of one of Brewster's most popular beaches, Breakwater Beach/Landing. Restoration of this and other Brewster beaches will provide a boost to the economic vitality of the Town and allow both residents and visitors to be able to continue to enjoy these precious resources. The provision of interpretive signage at the beach will help educate the public concerning the critical nature of coastal resilience issues and explain the Town's efforts to improve water quality for swimming, shellfishing and habitat.

The proposal includes a significant coastal retreat design for Breakwater Beach, which has one of the Town's largest beach parking lots. The project also includes restoration of the former parking area back to coastal dune habitat, as well as installation of green stormwater control. The engineering evaluation of this beach will provide short and longer term recommendations for nourishment or alterations and the effect this will have on the natural systems at Breakwater. The restoration/retrofit will provide significant ecological benefits, including restoration of beach and dune habitat for wildlife.

Brewster's 10 beaches are heavily used by both residents and visitors, with a summer population estimated at 25,000. Breakwater also provides access for emergency response, to shellfish grants, and for coastal nourishment projects. In recent years, storm damage and annual erosion rates of over 1 foot have significantly impacted this Town parking area and beach. The Town has invested significant amounts in recent years to repair this and other landings and the natural systems surrounding them, including $2,000,000 in salt marsh restoration and coastal retreat projects.

Brewster Chamber of Commerce
PO Box 1241, Brewster MA 02631
T: 508-896-3500 E: info@Brewster-CapeCod.com
www.Brewster-CapeCod.com

Among towns on Cape Cod, Brewster is a proven leader in protecting and restoring its natural coastal ecosystems. Over the last decade, the Town restored 11 acres of salt marsh at Quivett Creek; 10 acres of salt marsh at Namskaket Marsh; 21 acres of salt marsh surrounding Freemans Pond, the Town's only salt pond; and a further 20 acres of salt marsh at Paine's Creek in the Stony Brook Valley. In addition, Brewster and its partners have preserved more than one-third of its land as open space for conservation and water resource protection.

Sincerely,

Ms. S. Kyle Hinkle
Executive Director

Brewster Chamber of Commerce
PO Box 1241, Brewster MA 02631
T: 508-896-3500 E: info@Brewster-CapeCod.com
www.Brewster-CapeCod.com

Town Of Brewster
2198 Main Street
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(508) 896-3701 x1150
FAX (508) 896-8089
sleven@brewster-ma.gov

Office of:
Planning Dept.

Susan M. Leven
AICP
Town Planner

March 28, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Letter of support for the Town of Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

As the Planner for the Town of Brewster, I would like to add my support to Brewster's proposal- *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the Massachusetts Coastal Zone Management Department to support the Town's to support the Town's efforts to design and install natural coastal storm damage protection and enhance natural resources for this coastal area.

In the past five years, rather than armoring, Brewster has been proactive in retreating from one public beach parking lot that sustained repeated storm damage. Other public beach parking areas and access points have been storm damaged and, because of their location along the shore, are interfering with the function of the beach/dune/wetland complex at their locations. This proposal specifically addresses one of these locations, Breakwater Beach/Landing, with measured retreat and adaptation. By implementing natural approaches to mitigating coastal erosion and flooding problems, the Town will re-build the Breakwater dunes, enhancing and restoring these natural buffers to coastal storm waves, tides, and sea level rise, while preserving them as critical habitat for wildlife. Using bio-engineering approaches, the Town will trap and stabilize sand on Breakwater's beach and dunes with native grasses and shrubs, providing increased protection against storms and erosion.

I was hired as Brewster's first Town Planner in its 205 year history in 2008. Along with the job of establishing a Planning Department, I was also tasked with organizing and managing the Town's water planning process and development of the Town's Integrated Water Resources Management Plan (IWRMP). This connection of land use planning and water planning has enabled us to more effectively address water issues in Brewster. In recent years, Brewster has adopted a number of by-laws and regulations aimed at protecting the Town's land and water resources including our Natural Resource Protection Design by-law, the first conservation subdivision by-law adopted on Cape Cod, an illicit discharges by-law for municipal storm drains, as well as updated floodplain bylaws. Work is continuing on a zoning amendment to expand the Town's stormwater regulations, particularly as they apply to new development; and the creation of fertilizer regulations to reduce nutrient loads from these sources.

This project relocates infrastructure at risk to a higher elevation much further back from the coast, and replaces asphalt with permeable pavement, reducing the generation of stormwater. It also collects stormwater from other asphalt areas, and uses vegetated swales as a green method to treat and infiltrate stormwater, rather than allowing it to discharge onto the coastal beach as it does in its current configuration. Before and after comparisons in interpretive displays will help to educate our public about these issues and guide future adaptation across town.

I believe the work laid out in this proposal is critical to our future Town planning decisions. I urge you to support this important proposal that links ecosystem health with increased resiliency.

Sincerely,

Susan M. Leven AICP

Department of Public Works

201 Run Hill Road
Brewster, Massachusetts 02631-1898
Tel (508) 896-3212
Fax (508) 896-4540

Robert L. Bersin, PE,-Superintendent
Jeffrey Day, Foreman

March 24, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Letter of support for the Town of Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

The Town of Brewster Department of Public Works is pleased to support Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the Massachusetts Coastal Zone Management Department and to support the Town's efforts to increase the resiliency of one of our coastal beaches, along with restoration of the dune habitat and replacement of the parking areas lost to erosion.

The Town is proposing a specific project that involves coastal retreat, habitat restoration and the use of green infrastructure to treat and manage stormwater at this coastal landing and parking area.

Among towns on Cape Cod, Brewster is a proven leader in protecting and restoring its natural coastal ecosystems. In recent years, the Public Works Department has focused on treating and infiltrating stormwater along many of our coastal roads, in particular in the Stony Brook valley. The roads and landings leading to the coast were not designed for the current traffic and vehicle loads, and our aging infrastructure cannot handle the increasing stormwater load and effects of rising sea level. Our coastal landings take the brunt of winter storms, Nor'easters and hurricanes. The combination of being open to northeast and northwest winds and tidal ranges that can reach over 10 feet at high tide makes Brewster especially vulnerable to coastal storms and storm surge. My department is not equipped nor funded to regularly rebuild our crumbling public landings. Government funding of restoration projects, such as proposed for Breakwater Beach/Landing, is critical to the Town's ability to protect important recreational assets, emergency access points and habitat areas. This project will also serve to improve water quality for swimming, shellfishing and habitat.

Planning to upgrade and relocate key infrastructure is essential. The proposed project will provide increased resiliency to coastal storm events at one of our most threatened landings. I believe this project will also provide transferrable results that can be used by other coastal communities, on and off Cape Cod. Brewster has demonstrated experience in managed retreat and coastal restoration. I urge you to support this important proposal.

Sincerely,

Robert L. Bersin, PE, Superintendent
Brewster Department of Public Works

Town of Brewster
Community Preservation Committee
2198 Main Street
Brewster, Massachusetts 02631-1898
(508) 896-3701 x 133
Fax (508) 896-8089

April 2, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Letter of support for the Town of Brewster's proposal ***Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach*** to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

I am pleased to support Brewster's proposal of a ***Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach*** to the Massachusetts Coastal Zone Management (CZM) Department for funding towards the Town's efforts to increase the resiliency of one of Brewster's most popular bayside recreation areas.

The Community Preservation Act (CPA) is designed to help communities protect their most unique natural, community and built features that give towns their special character, while advancing smart growth and sustainable development. The fund must be used to acquire/create/preserve Open Space and Recreation (passive) lands, acquire/preserve/rehabilitate/restore Historic Resources, create/preserve/support Community Housing, and acquire/create/preserve/ rehabilitate/restore land for Recreational (active and passive) use.

The state recently changed the allowed uses of Community Preservation Committee (CPC) funds for Recreation. This change has allowed our committee to approve a number of recreation applications for CPC funds that restored or preserved recreation areas. Brewster's Beaches and Landings are among the most important recreation areas in Town and are the main reason for our ever expanding tourist economy. The Town's year round population of 9,820 increases to an over 25,000 seasonal population.

The CPC was pleased to approve the Department of Natural Resources application for matching funds towards this CZM grant application and send it to the Board of Selectmen for inclusion on the spring 2014 Town Meeting warrant.

We based our approval on the Town's integration of coastal science, data on our changing coastline, estimates of future sea level rise, and the public participation process in guiding our planning and installation of a sustainable program for this beach. This work will be led by the Town's Department of Natural Resources and will include the Conservation Commission, the Planning Department, the Department of Public Works, and our Fire & Rescue Department as our Emergency Management Coordinator. The engineering firm we are partnering with are experts in their field, and Brewster has a record of successful projects with them.

This Green Infrastructure Project at Breakwater Beach incorporates future planning for sea level rise and protection of this beach area for the foreseeable future. A key facet of CPC approval is the fact that this beach will not need to be the subject of repeated applications for CPC funds for more preservation needs, since future needs are incorporated within this project. Applications need to be fiscally responsible to obtain CPC support.

As the Committee responsible for approving such funding requests for Town Meeting vote, we believe the work laid out in this proposal is critical to restoration of this popular recreational park, a vital asset to the economic vitality of the Town. Brewster has demonstrated experience in managed retreat and coastal restoration. We urge you to support this important proposal to build Green Infrastructure and Restore Breakwater Beach/Landing.

Sincerely,

Elliot G. Carr

Elliot G. Carr, Chairman
Brewster Community Preservation Committee

Brewster Fire Department

1657 Main Street
Brewster, MA 02631
Phone 508-896-7018 Fax 508-896-4245

March 21, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Letter of support for the Town of Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

The Town of Brewster Fire Department is pleased to support Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the Massachusetts Coastal Zone Management Department to support the community's efforts to mitigate coastal change and protect one of the Town's most popular beaches from further destruction and erosion of the beach, parking areas, and dunes.

The Town is proposing a specific and valuable project for protection against coastal erosion of beach and dune areas, provision of habitat restoration, and use of green infrastructure to treat and manage storm water at this coastal landing and its adjacent parking area.

Working cooperatively with our Town GIS staff we have developed estimates of properties and infrastructure that will be affected by rising sea levels and potential future storm events and coastal flooding. Based on the identified issues, we have found the need to develop and establish long term plans to replace vulnerable coastal infrastructure and to identify and provide access points to these areas for emergency vehicles and personnel which are both critical components of our community's Emergency Response Plan.

The proposed green retrofit for Breakwater Beach/Landing will be an integral part of how Brewster adapts and keeps its citizens safe in that the landing specifically provides access for emergency vehicles and personnel during and after storm events, as well as for rescue operations in the bay and extensive tidal flats throughout the year. The proposed 8-foot wide path constructed of articulated concrete blocks (ACBs) will allow for continued vehicle access to this beach. This planning effort will also help citizens and visitors to better understand the risks inherent in living in a coastal town and the response needs of local fire and EMS services to these areas. Most importantly, the plan will ensure our community's first responders are provided a work environment that supports their personal safety and the safety of our residents.

I believe this project will also provide transferrable results that can be used by other coastal communities, on and off Cape Cod through using Brewster's experience in managed retreat and coastal restoration as a model for their own projects. I urge you to support this important proposal.

Sincerely,

Robert Moran, Chief
Brewster Fire Department

Town of Brewster
2198 Main Street
Brewster, Massachusetts 02631-1898
(508) 896-3701 x1150
Fax (508) 896-8089
brewplan@town.brewster.ma.us

Office of:
Comprehensive Water Planning Committee

March 28, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Letter of support for the Town of Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

As Chair of the Town of Brewster Comprehensive Water Planning Committee (CWPC), which is responsible for evaluating Brewster's water resources, I am pleased to support Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the Massachusetts Coastal Zone Management Department to support the Town's efforts to increase the Town's resiliency of one of our coastal beaches' infrastructure, beach and dune system.

Brewster started its Integrated Water Planning efforts in 2008 with hiring our first Town Planner, whose responsibilities included overseeing the development of the Town's Integrated Water Resources Management Plan (IWRMP). A Comprehensive Water Planning Committee (CWPC) was formed in 2009. Over the last 5 years, the Town has produced an analysis of the existing information and materials available for the IWRMP; several projects to address areas where data was lacking, or where data sources could not be linked under present conditions; a needs analysis for drinking water, wastewater, surface water and stormwater; and a report analyzing possible alternatives to address both existing regulatory limits on nutrients and surface water pollution issues. To date, the Town has appropriated over $700,000 for water planning efforts.

This project will provide an essential demonstration project for Brewster citizens, showing how natural systems can function to provide storm damage protection, and best manage the long term effects of an eroding and receding shoreline. The engineering/design portion of this project will address significant stormwater issues for Breakwater Beach/Landing as identified in the IWRMP by minimizing its generation and by using natural systems to absorb and treat

nutrients and pollutants. It will also improve the resilience of the infrastructure of this vulnerable area, as well as improve water quality, shell fishing and habitat.

I believe that this proposal is critical to restoring important coastal infrastructure and informing future Town coastal planning decisions. CWPC has also supported Brewster's Coastal Resiliency Grant application and this *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* is a natural follow-up. I urge you to support this important proposal that links ecosystem health with increased resiliency.

Sincerely,

Lemuel Skidmore MS, MPH
Chair, Brewster Comprehensive Water Planning Committee

Town of Brewster

2198 Main Street
Brewster, MA 02631-1898
Phone: (508) 896-3701
Fax: (508) 896-8089

Office of:

Board of Selectmer
Town Administrato

March 24, 2014

Julia Knisel, Coastal Shoreline & Floodplain Manager
Executive Office of Energy & Environmental Affairs
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Letter of support for the Town of Brewster's proposal *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the ENV 14 CZM 07 Green Infrastructure for Coastal Resilience Pilot Grant Program

Dear Ms. Knisel,

The Town of is pleased to submit its proposal for *Brewster Green Infrastructure Project: Coastal Resilience at Breakwater Beach* to the Massachusetts Coastal Zone Management Department to support the Town's efforts to design and install natural coastal storm damage protection and enhance natural resources. By implementing natural approaches to mitigating coastal erosion and flooding problems the Town will re-build the Breakwater dunes, enhancing and restoring these natural buffers to coastal storm waves, tides, and sea level rise, while serving as critical habitat for wildlife. Using bio-engineering approaches, the Town will trap and stabilize sand on Breakwater's beach and dunes with native grasses and shrubs, providing increased protection against storms and erosion.

In the past five years, rather than armoring, Brewster has been proactive in retreating from one public beach parking lot that sustained repeated storm damage. Other public beach parking areas and access points have been storm damaged and, because of their location along the shore, are interfering with the function of the beach/dune/wetland complex at their locations. This proposal specifically addresses one of these locations, Breakwater Beach/Landing with measured retreat and adaptation.

Brewster's proposal lays out a comprehensive science-based approach to assessment, planning, and design of a coastal resiliency program for Breakwater. We recognize the importance of integrating coastal science, data on our changing coastline, estimates of future sea level rise, and the public participation process in guiding our planning and installing a sustainable program for this beach. This work will be led by the Town's

Department of Natural Resources and will include the Conservation Commission, the Planning Department, the Department of Public Works, and our Fire & Rescue Department as our Emergency Management Coordinator. The engineering firm we are partnering with are experts in their field, and Brewster has a record of successful projects with them.

As the Board responsible for setting Town policies and priorities, the Board of Selectmen believes the work laid out in this proposal is critical to restoration of this popular recreational park, a vital asset to the economic vitality of the Town. Brewster has demonstrated experience in managed retreat and coastal restoration. We urge you to support this important proposal to build Green Infrastructure and Restore Breakwater Beach/Landing.

Sincerely,

Brewster Board of Selectmen

John Dickson, Chairman

James Foley, Vice-Chairman

Patricia Hughes, Clerk

Peter Norton

Benjamin deRuyter